base of the superficial crust of the earth was no sooner set aside by men of sound reflection, than theorists invented another term (trachyte) to supply its place; and Humboldt, who on many occasions draws largely on the credulity of his readers, speaks of whole volcanic mountains formed of this material, which is to be considered as lava in its changed state: thus errors promulgated by learned men are received and perpetuated, standing as an almost impregnable barrier against truth, and the stumbling-blocks to discoveries of much greater importance.

Mr. Lyall, in his very interesting romance termed "Elements of Geology," gives an analysis of minerals most abundant in what he is pleased to term volcanic and hypogene rocks; and, on reference to his analysis, the reader will readily perceive that their character is determined by mere modifications of mixture of silica, alumina, magnesia, lime, potash, soda, iron, and manganese, with the occasional omission of one or more of these ingredients. The earths, in their disintegrated or divided state, exhibit the like combinations, and the accident of flood or fire acting upon them cannot by any means obliterate or change the nature of these earths. We find them forming the lower as well as the upper beds, the ingredients of sedimentary deposits, and the ingredients of lavas, in the state of mud, of clay, of slate, of porphyry, jasper, and various other rocks. We see them continually abstracted from the inner beds of the earths, and ejected as rivers and torrents of mud from volcanoes, as well as in the melted or lava form. On the other hand we see them in the sediments of rivers and seas gradually and progressively increasing in extent, and gradually undergoing changes in their disposition and chemical and mechanical combinations, as they are influenced by local influences of temperature and association. It is therefore idle to say that such a rock is volcanic under any circumstances, unless we are to presume that the action of internal heat upon terrestrial masses is productive of these earths. No one presumes that a brick is volcanic, simply because the bed from whence it was abstracted is open to the observation of all; like glass it is admitted to be an artificial product, and so is obsidian, but lava in general is not; for although abstracted from the interior beds and united with water, or acted upon by fire, its character and composition remain unimpaired: but where the melted material assumes an artificial state of induration, the term may then be applied; but even then I think unwisely, when it gives rise to a system of generalization so utterly at variance with nature.

It is acknowledged that the upper crust of the earth consists of series of overlying beds, locally disposed and locally varying from each other, and being of homogeneous as of mixed qualities. Every one of these beds, however deeply disposed at present within the earth, was once the uppermost; and while in this position was the particular subject of moving or disturbing causes. While beneath the waters in its disintegrated state, it was subject to division by tidal currents, to local intermixture of sedimentary deposits, and to intersection by deposits of nature differing from its own taking place in those divisional parts. Again, on dry earth it was subject to the like action of streams and rivers, of grooving or channelling out in various directions, of intermixtures with other earths, or of minerals conveyed within its matrix by percolating waters. In every state it was subject to fracture, dislocation, separation of parts, and partial decay; and having undergone these changes, we can readily conceive its becoming covered in by succeeding depositions, its fractures and inequalities filling up by the overlying matter, and forming dikes and other intervening beds, now so commonly and so fondly ascribed to volcanic causes alone. Every person who has traversed regions of the tropics during the dry season of the year, or in rainless regions, cannot fail to have observed the enormous and deep-seated rents and fissures which take place in the earth's superficial crust, and many a time and oft it is that these fissures extend to and divert the course of waters from the natural beds, which rushing into the aperture thus made, carry with them material varying in its nature from the beds in which it is finally deposited. Earthquakes, whether proceeding from volcanic action, or the pent up vapours generated within the bowels of the earth, are productive of the like effects.

It is my wish to render these matters more familiar to my readers, in order to shew them, that however tempting the science of geology may appear, and however imposing its assumptions, that there are facts in nature militating against these assumptions, and presenting in their purity and simplicity a natural solution to phenomena which men delight to robe in the veil of mystery. Trap is said to be of volcanic origin, but the very facts brought forward in support of this supposition, prove the direct negative. In England, in the islands of Arran, Sky, and other parts of Scotland, it is the overlying bed, and is always found filling in the vertical fissures, dykes, and veins of the underlying rock, taking the form of the opening, and continously appearing the whole extent of it. The fissures are, in general, those common to many consolidating beds, which, contracting in their parts, as acted upon by the long and intense atmospheric heat, separate, and present to the view deep vertical fissures; and these rocks afterwards in this state being covered in by the loose earth, the fissures fill up with the same substance.

Again, if the fissures thus formed, exist in disintegrated masses, then we generally find that the filling in material when united with water, alters by combination the character of this bed to such an extent as it is capable of permeating. This is exemplied by a striking example quoted by Mr. Lyall, in favour of his theory, of the mass being projected from beneath. The dyke is 134 feet wide, and consists of a rock, variously termed by different writers, a compound of felspar and augite. Strata of shale and argillaceous limestone, through which it cuts perpendicularly, are altered to a distance of 30 and 35 feet from the edge of the dyke. The shale as it approaches the trap, becomes gradually more compact, and is most indurated when nearest the junction. Here it loses part of its schistose structure, but the separation into parallel layers is still perceptible. In several places the shale is converted into a hard porcellanous jasper. In the most hardened part of the mass the fossil shells principally productæ, are nearly obliterated; yet even here their impressions may frequently be traced. The argillaceous limestone undergoes analogous mutations, losing its earthly texture as it approaches the dike, and becoming granular and crystalline. But the most extraordinary phenomena is the appearance in the shale of numerous crystals of analcime and garnet, which are distinctly confined to those portions of the rock affected by the dike.

In Antrim the chalk is converted into granular marble near the basalt, and many other examples of change are adduced by geologists to shew that the intruding matter has caused a manifest change in the contiguous beds. What then, in this respect, becomes of Sir John Hall's hypothesis, that crystalline rocks are formed under exceeding high pressure, accompanied with a corresponding high degree of heat, the intruding matter could have had upon the vertical beds whose fissures it filled in, no effect other than that daily exhibited by the filling in of earths or marl; for if in the melted liquid state of lava, instead of contributing to the density of the beds in contact, it most probably, by abstracting some portion of their material contributed to their expanding power, and instead of crystallizing, would have caused them to become more pulverulent: but these beds have evidently acquired earths at the points of contact which they previously did not possess, and such as are received by loose deposits or simply cohesive rocks through the agency of water, by the introduction of carbon or of mineral gaseous or fluid bodies. The dike is in general compact and highly silicified, and the bed in contact has evidently received the excess of silica in its external parts, whereby it has become a harder and more ponderable body; nay, in many instances the intruding matter filling up these dikes or fissures, has evidently blended with the primary bed to a limited extent, proving thereby, that the one and the other were in their decomposed state; and this is particularly observable in some of the limestones, which by contact present a compound union of lime and alluminous earth.

Brochant's able summary against the Volcanic, and in favour of the Nepturian theory, embraces the facts, that if true basalts are found among the products of burning mountains, they are extremely rare, and modern eruptions have not produced any. Their prismatic and tabular form is not peculiar to trap, but extends also to gypsum, marls, and sandstones. They often repose immediately over coal, as at Miessner, near Cassel; and, we may add, many of the coal beds of this country. They embrace the remains of animals and vegetables; they often contain hydratic agates. There is no appearance of vitrification, nor have real craters ever been discovered; all those which have been cited being natural hollows or chasms. Mandelstein has certainly some resemblance to porous lava; but it is palpably manifest that some mandelsteins are not volcanic. Rocks might re-combine, but substances would certainly be left, as at present, denoting the action of fire. In Bohemia and different countries, beds of basalt have been observed to alternate with grit or stratiform limestone. There are many basaltic regions where basalt is only found in summits. Basalt has no appearance of fusion; heated in a furnace it melts to glass. The prismatic division of basalt has been attributed to the water of the sea. The conical form of basaltic mountains is common to all submarine hills formed by contending tidal action over a wide area of the sea.

But the most unanswerable argument against the volcanic formation of rock, is the fact demonstrable to all men, and open to observation, that those particular varieties which it is insisted upon are volcanic, are even now to be observed in every stage of formation, both in Asia and Africa. Dolomieu, a very attentive and accurate observer of rock, has expressed his opinion that the basalt of the ancients is not a volcanic product. Of the vast number of Egyptian monuments examined by him in the Borgean Museum, many, he says, are formed of stones having qualities attributed to basalts, but not one is volcanic. In this I can most fully bear him out, for all the Siderous rocks, of which I about to speak, abound in Egypt, and are disposed in the pure oceanic and undisturbed strata, and could not possibly be formed by volcanic action. Again, we observe the material of which they are composed in the newest formations, disposed on either side of the Red Sea; and also the progressive stages of their formation, and of transition into other varieties of rock. These beds are most decidedly marine deposits, and abstracted from the waters by their gradual decrease; these masses of matter, after long exposure to atmospheric action, become gradually cemented together by silica, in like manner as porphyry, amygdolite, jasper, and other amorphous rocks; the difference of the one and of the other being only in the nature and qualities of the bodies, and fragments of bodies, of which they are composed; all of them boasting a common parentage, a simultaneous development, and common properties, and being subject to the like atmospheric influences in those regions where they abound.

Siderous Rocks.—Having in the above general remarks on the modern theories concerning the origin of all crystalline and many amorphous rocks, spoken of basalt, I shall now proceed to consider the division under which it is placed.

Siderous rocks are those rocks which are particularly characterized by the great quantity of iron they contain; it being, in general, uniformly diffused throughout the whole bed, gives this rock a marked and decided character, manifest to observation, and confirmed by fracture and analysis. The distinguishing characters of siderites are generally basaltic, sometimes only marmoric hardness; fracture commonly foliated, sometimes radiated; weight siderose, sometimes approaching to the barytose; lustre splendent, shining between vitreous and pearly, opaque, the green sometimes translucent on the edges; colour generally black, sometimes of a greenish grey. It sometimes composes entire mountains, but more commonly occurs disseminated in veins or nodules in granite, or beds of gneiss.

Siderites, says Pinkerton, may be characterized by their silky or crystalline appearance, basalts by their dull earthy aspect; the one, in fact, is the mere modification of the other, and in a different stage of change; for basalt, upon long exposure to a dry hot atmosphere, passes of necessity into the crystalline form of